Standard Trouble Shooting Instructions

Applicable for R250s PRO

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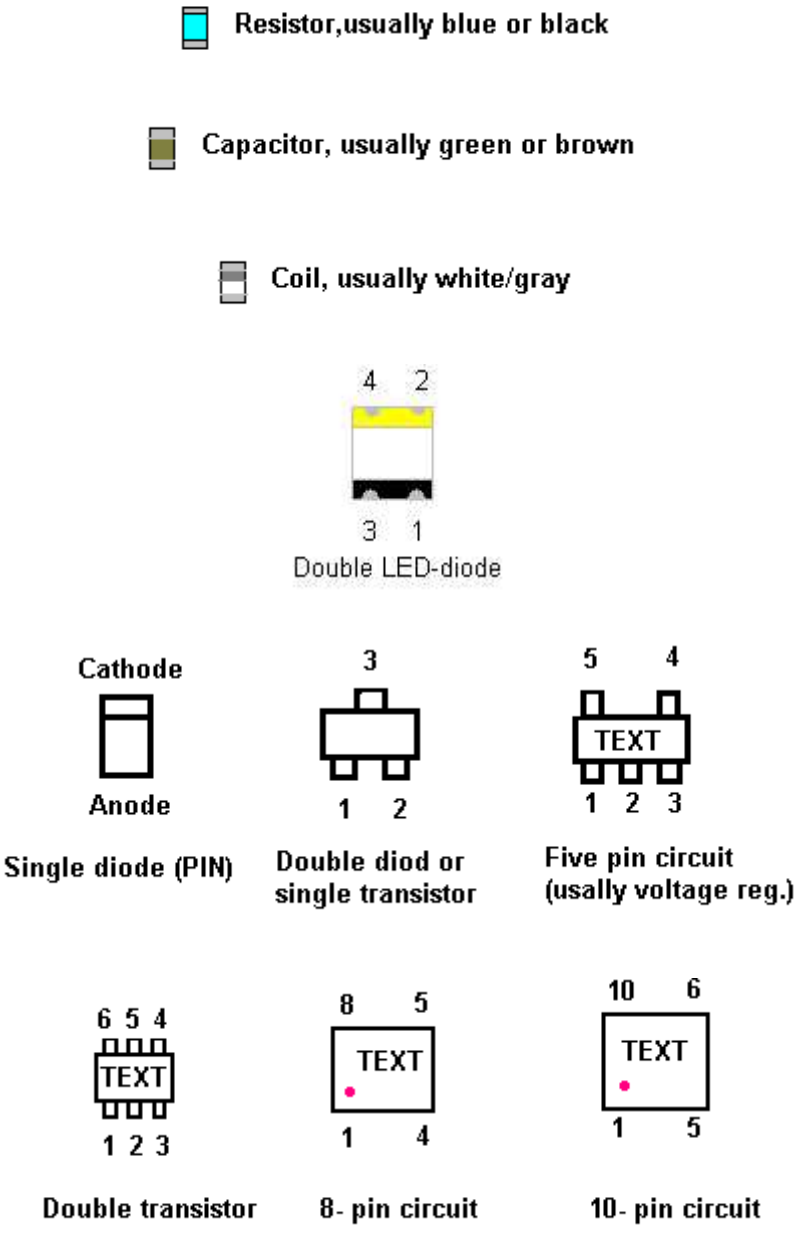
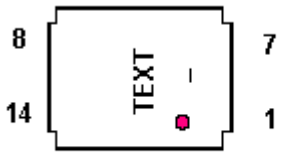
1 Explanations

1.1 Component placement reference

For component placement see doc.1078-2/FEA 209 544/18

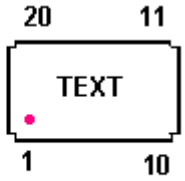
1.2 Pin placement



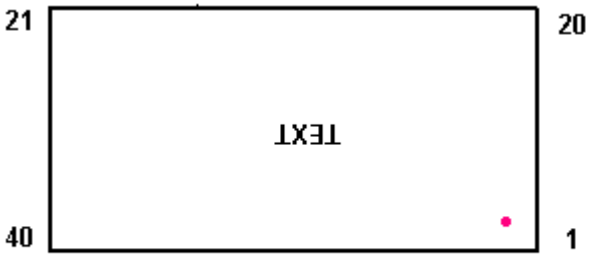


14- pin circuit

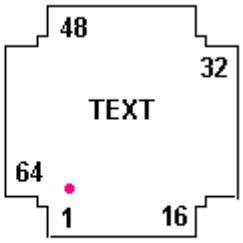
16- pin circuit



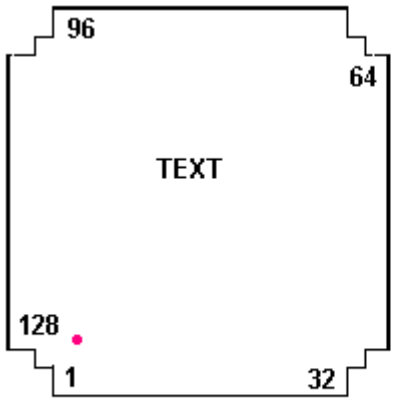
20- pin circuit



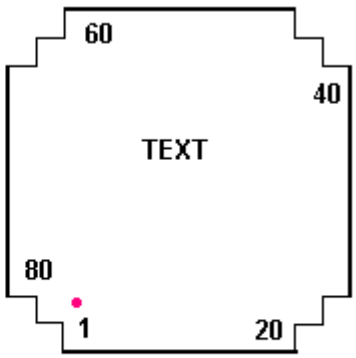
40- pin circuit



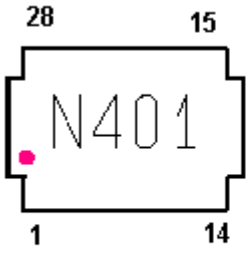
64- pin circuit



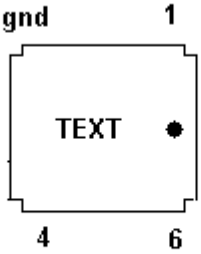
128- pin circuit



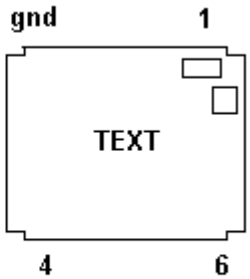
80- pin circuit



28- pin circuit



RX- VCO



TX-VCO

1.3 Abbreviations

B: Crystal.

C: Capacitor.

D: Digital circuit.

F: Over voltage protection.

H: Buzzer, LED, pads for display.

J: Connector.

L: Coil.

N: Analogue circuit, power amplifier at some phones.

R: Resistor.

S: Keyboard pads.

V: Transistor, diode.

X: Contact surface at the circuit board.

Z: Filter.

DCIO:	DC voltage through the system connector for charging.
GND:	Ground.
LED:	Light emitting diode e.g. the background illumination.
LO:	Local oscillator.
RTC:	Real Time Clock, the clock that keeps track of time.
SIMCONCLK:	Signal from the processor used for communication to SIM, clock signal.
SIMCONDAT:	Signal from the processor used for communication to SIM, data signal.
SIMCONRST:	Signal from the processor used for communication to SIM, reset signal.
SIMVCC:	Feed voltage for SIM.
VBATT:	Battery voltage.
VDIG:	DC voltage for the processor and memory.
VDSP:	DC voltage for the DSP (Digital Signal Processor).
VLCD:	DC voltage for the display that controls the contrast.
VRAD:	DC voltage for the radio part except the synthesizer.
VVCO:	DC voltage for the synthesizer.
I2C:	Two line serial communications standard using one clock and one data line.
PWM:	Pulse Width Modulation

2 Network problems

2.1 Find out if the fault is RX or TX related

Connect the phone, with the signalling program, to a GSM test instrument and try to get serv at -68,5 dbm signal strength.

If the phone gets serv, go to the section 2.1.2.

If the phone does not get serv, the fault probably is dependent on the LO part, or the losses in the signal path are too great, go to section 2.1.1.

2.1.1 The phone does not get SERV

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Check visually the antenna connector X101, checks if it is damaged, bad soldered or dirty.

If necessary, replace X101.

Check for bad soldering at C314, C318, C319, N301, N302 and N303.

Measure the resistance and replace the faulty component of C530, C531, C532, C533, C534 and C535, all >200 kohms.

Measure the resistance and replace the faulty component of C850>100 kohms, C851>1kohm, C833>1kohm, C853>100kohms.

Check for bad soldering at Z250, Z500, Z201 GSM900, Z202 GSM1800 and Z205.

Give the board power and start it up.

- Measure VRAD (3,8V) at C433.

  If the voltage is incorrect, go to the section On/ Off problems.

- Measure the DC voltage at N303 pin4 and pin6.
  Pin 4 = variable control voltage between 0,8-2,8V (usually 1,7V at the start).
  Pin 6 = variable feed voltage (3,3V usually at the start of the board).

  If N303 pin 6, the feed voltage is too low or missing.

  Check the soldering at D105, D103 and D600 pin8 and pin102.

  Measure VVCO 3,8VDC at N410 pin5.

  If not, replace N410.

  If yes 3,8V at N410 pin 5, measure the level 3,8V at V305 pin 2.

  If yes 3,8V at pin 2, replace V305 and C321.

  If no 3,8V at pin 2, replace R301.

  If N303 pin4, the control voltage is too high (3,6V).

  Replace N301.

If pin4, the control voltage is too low or missing.

Measure the resistance of R312~22 kohms.

If R312 is ok, measure the control- voltage 1,7V at N301 pin5, at the start of the board.

If the control voltage is too low or missing, replace N301 and C317.

If the control voltage is ok at N301pin5 and too low at N303 pin4, replace C319 and C314.

If the fault still remains, send the unit on according to the local company directives.

2.1.2 The phone gets serv

Set the GSM test instrument at power level 5 and the signal strength -68,5dBm, for GSM900.

To try GSM1800, set the power level 0 and the signal strength of -68,5dBm

Set up a call to a GSM test instrument.

If it works.

Go to the section 2.1.3,read the RX level from the GSM instrument while the call is connected.

If it does not work.

Probably the fault is located at the TX.

If calls cannot be connected at the lower channels only, then the fault is N570, and the phone can not be repaired at this level, send the unit on according to the local company directives.

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Check visually the antenna connector X101, if it is damaged, bad soldered or dirty.

If necessary, replace X101.

Measure the resistance from the P401 test point, to ground >10 kohms.

If the resistance is too low, usually 200 ohms, then N401 is damaged, and the phone can not be repaired at this level, send the unit on according to the local company directives.

Check that L403 not is burned.

Check the soldering at Z205, Z203, GSM900 and Z204 GSM1800.
Check the soldering at N560 and N570.

Measure the resistance at C853 >100 kohms, L560 and L223~0 ohm.

If the fault still remains send the unit on according to the local company directives.

2.1.3 Read the RX level value from the GSM instrument while the call is connected

If the RX-level is at 40-46 steps, make sure the output power is 31-35 dBm for GSM 900(power level 5) or 28-32dBm for GSM1800 (power level 0).

If it is correct, lower the signal strength to -102dBm for GSM 900 and make sure the RX-level is 6-12 steps and that the RX-quality value is at 0-2steps.

For GSM 1800 the signal strength should be -100,5dBm,the RX-level value 7-13 steps and the RX-quality value 0-2 steps

Make a call to the public net and check the audio part.

If it is ok, the phone has passed the test.

If the phone can not connect a call to the public net:

Check if the phone is locked out of the system due to theft.

If it not is locked out, replace D600.

- If the phone can't connect a call at any of the lower channels (GSM900) but at other higher channels, or if it can not switch from another high channel to channel 1 (or several lower channels) it means that N570 is faulty and the phone can not be repaired at this level, send the unit on according to the local company directives.

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure the antenna connector X101 is not damaged, badly soldered or dirty.

If the RX-level value is below 40 steps at -68.5dBm signal strength there is an RX-related fault.

Measure the resistance of C530-C535 >200 kohms.

Check the soldering at Z250, Z500, Z201 GSM900, Z202 GSM1800 and Z205.

If the fault remains send the unit on according to the local company directives.

If the RX level value is above 45 steps at input signal -68,5 dBm or the RX quality is high, the phone needs to be calibrated. Send the unit on according to the local company directives.

If the output power is too low, check the soldering at N560, N570, Z205, Z203 and Z204.

If the fault remains, send the unit on according to the local company directives.

3 On/Off problems

3.1 Starting the phone pressing the On/Off key

1. Remove the battery and make a visual check of the battery connectors, make sure they are intact.
2. Insert a dummy battery into the phone, start it up by pressing the On/Off key and check the current consumption.
3. If the phone starts, check the charging function by connecting a charger at the system connector. If it does not charge go to chapter **Charging problems**.
4. If the phone does not consume any current when the On/Off key is pressed, go to 3.2.
5. If the phone consumes 1-200 mA, starts (and request for SIM, seeks net, etc....) and works as long as you keep the On/Off key pressed, go to 3.3.
6. If the phone starts but consumes more than 200mA go to 3.4.
7. If the phone does not start try to reprogram it in the flash programmer.
8. If the phone does not start in the flash programmer go to 3.5.
9. If the phone is programmable but not start afterwards go to 3.6.

3.2 The phone does not consume any current when the On/Off key is pressed

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure the battery screws are correctly tightened.

Make sure the system connector pads-J602, not are damaged or burned.

Remove the domefoil, according to mechanical Instructions, and make sure that the keypads are not broken, liquid damaged or dirty especially the On/Off key.

No further action should be taken for a liquid damaged telephone.

Give the board power.

- Make sure there is VBATT voltage at the pad of the On/Off keypads.

  If VBATT is missing there is a foil damage, send the unit on according to the local company directives.

  If VBATT is correct, measure the resistance from the other pad, ONSRQ, to V702 pin 1 ~0 ohms.

  If the resistance is incorrect there is a foil damage, send the unit on according to the local company directives.

  If the resistance is correct, replace V702.

  If the fault remains, send the unit on according to the local company directives.

3.3 The phone runs as long as the On/Off key is pressed

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure the system connector pads-J602 not are damaged or burned.

Mount the board in the fixture. Start it up and keep it running by keeping DCIO high.

- Measure the voltage at C692 >3V.

  If it is correct, check the soldering at D600 pin 119, measure the resistance of C692 >200 kohms

  If the resistance is incorrect replace the capacitor.

  If the resistance is correct, measure the input voltage at N706 pin 2 (VBATT), and the output voltage at pin 3 ~3.5V. Make sure that there is ground at N706 pin 1.

  If VBATT or ground is missing there is a foil damage, send the unit on according to the local company directives.

  If VBATT and ground are correct but not the output voltage, replace N706.

  If they are all correct, measure the voltage at the positive side of the backup capacitor, C720 ~3.2V.

  If it is incorrect, measure the resistance of R720 ~180 kohms, and R719 ~47kohms.

  If they are correct, replace V711.

  If the voltage is correct, measure the resistance from the positive side of C720 to C692 ~0 ohms.

  If it is incorrect then there is a foil damage, send the unit on according to the local company directives.

3.4 The phone consumes more than 200 mA

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure the system connector pads not are damaged or burned.

Mount the board in the fixture. Start it up and keep it running by keeping DCIO high.

- Check the current consumption again.

  If it is more than 200mA, replace the display and the elastomer and try again.

- Check the resistance from VBATT to ground >1 Mohms.

  If it is less, send the unit on according to the local company directives

- Check VDIG on N702 pin5 and VDSP-N701 pin5 voltage ~3.2V.

If any of the voltage are too low, measure the resistance from it to ground (VDIG - >500 ohms, VDSP - >25 kohms).

If the resistance is correct, replace the corresponding regulator.

If it is too low, send the unit on according to the local company directives.

If any of the voltages are too high, replace the corresponding regulator.

- Measure VRAD on N412 pin5, VVCO-N410 pin5 and VRPAD-N411 pin5 volt-ages ~3.8V.

  If any of the voltage are incorrect, measure the resistance from it to ground (>50 kohms).

  If the resistance is correct, replace the corresponding regulator.

  If that does not help, or the resistance still is too low, send the unit on according to the local company directives.

3.5 The phone does not start in the flash programmer

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure the system connector pads are not damaged or burned.

- Measure the resistance of R421 ~ 0.1 ohm.

  If R421 is replaced, the charging function has to be verified. If it's incorrect, send the unit on according to the local company directives.

Mount the board in the fixture. Start it up and keep it running by keeping DCIO high.

- Check VDIG-N702 and VDSP-N701 voltage 3.2V.

  If any of the voltage are too low, measure the resistance from it to ground (VDIG >500 ohms, VDSP >25 kohms).

  If the resistance is correct, replace the corresponding circuit, VDIG - N702, VDSP - N701.

  If the resistance is too low, send the unit on according to the local company directives.

  If any of the voltages are too high, replace the corresponding circuit.

- Check the power reset (PWRRST) voltage at C710 >3V

  If it is lower, check R704 ~0 ohms and R725 ~100 kohms.

  If they are ok, first replace C710 and if it does not help, replace N703.

- Measure the voltage VRAD-N412 pin5, VVCO -N410 pin5 and VRPAD-N411 pin5 voltage ~3.8V, fig.

  If any of the voltages are incorrect, measure the resistance from it to ground >50 kohms.

  If it is correct, replace the corresponding circuit.

  If the resistance is too low, send the unit on according to the local company directives.

- Check the amplitude of the 13MHz system clock at B510 pin 1 ~1V t-t.
  Measure it by using an oscilloscope, spectrum analyser, frequency counter or diode probe.

  If the amplitude is too low, send the unit on according to the local company directives.

  Make sure there aren't any faulty soldering at D600 or D610.

  If it looks good, replace D600 first and then D610.

NOTE! Do not replace any of the components unless you have established the fact that B510 is functional. Try programming the phone in between.

If the fault still remains send the unit on according to the local company directives.

3.6 The phone does not start after flash programming

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure the system connector pads are not damaged or burnt.

- Measure the resistance of R421 ~0.1 ohms.

  If R421 is replaced, the charging function has to be verified. If it is incorrect, send the unit on according to the local company directives.

Mount the board in the fixture. Start it up and keep it running by keeping DCIO high.

- Measure VDIG-N702 pin5 and VDSP-N701 pin5 voltage ~3.2V.

  If any of the voltage is too low, measure the resistance from it to ground (VDIG - >500 ohms, VDSP - >25 kohms).

  If the resistance is correct, replace the corresponding circuit.

  If it is too low, send the unit on according to the local company directives.

  If any of the voltages are too high, replace the corresponding circuit.

- Check the power reset (PWRRST) voltage at C710 >3V.

  If it is less, measure the resistance of R704 ~0 ohm and R725 ~100 kohms.

  If they are correct, replace C710first and then N703.

  If that does not help measure VRAD-N412 pin5, VVCO-N410 pin5 and VRPAD-N411 pin5 voltage ~3.8V.

  If any of the voltages are incorrect, measure the resistance from it to ground (>50 kohms).

  If the resistance is correct, replace the corresponding circuit.

  If the resistance is too low, send the unit on according to the local company directives.

Make sure there are not any faulty soldering at D600 or D610.

If it looks good, replace D610 first and then D600.

NOTE! Program the phone in between.

4 Audio problems

4.1 Type of fault

Make a call to another phone.

Check which part is faulty, (microphone, and earphone).

Switch ON manually the loudspeaker.

Check which part is faulty (microphone, loudspeaker).

If the microphone is faulty, go to the section 4.1.1 microphone problems.

If the earphone is faulty, go to the section 4.1.2 earphone problems.

If the loudspeaker is faulty, go to the section 4.1.2 earphone problems.

Connect a handsfree to the phone.

Make a call to another phone.

Check which part is faulty, the external microphone or the external earphone.

If the microphone is faulty, go to the section 4.1.3 hands free problems (microphone).

If the earphone is faulty, go to the section 4.1.4 hands free problems (earphone).

If the hands free is not detected, go to the section 4.1.5 hands free can not be detected.

If you can communicate with a handsfree, but you can not communicate without a handsfree, go to the section 4.1.6 microphone and earphone problems.

If the sound is disturbed or noisy, go to the section 4.1.7 noisy sound.

If the mute function does not operate, proceed the section 4.1.8 mute problems.

4.1.1 Microphone problems

Disassemble the phone and check for liquid damage, especially around X830.

No further action should be taken for a liquid damaged telephone.

Replace the microphone and the elastomer.

Check the soldering of N800 pin 13 to pin 18.

- Check the soldering and measure the resistance of R809, R810, R811, R812, R813, R814, R816, R817 and R820.

  Replace the faulty component.

  If the resistance of R820 is too low after it has been replaced, replace V805 and C832.

  If the fault remains:
  Check the resistance of R818>10 kohms, if not replace R818 and C820.

  If all the resistances are OK. Check the soldering and measure the resistance of C815.It should be > 50 kohms.

If not replace C815 and C816.

If the fault remains:
Check the soldering and measure the resistance of C850 >100 kohms and C851>1 kohm.

Replace the faulty component.

If the fault remains:
Check the soldering and measure the resistance of C801, C808, C814, C818, C819, C829, C830, C831, and C834. They should be > 100 kohms each.

Replace the faulty component.

If the fault remains:
Replace V803.

If the fault still remains send the unit on according to the local company directives.

4.1.2 Earphone problems

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Check the speaker pogo pin contact (connection between J900 at the board and the earphone).

- Measure the resistance of the earphone in the front cover; it should be 8 ohms.

  If the resistance is higher replace the front cover.

If the fault remains: Check the soldering of N800 pin26.

- Measure the resistance between J900 pin1 and ground ~56 kohms,
  pin2 and ground ~56 kohms.

  If the resistance is lower, replace C909 (and C927).

  If the resistance was ok.
  Measure the resistance and check the soldering of R906 ~100 ohms, R914~0 ohm R917~10 kohms, R919~10 kohms, C914~56 kohms, C913~150 kohms.

  Replace the faulty component.

  If all the measurements are ok:
  Check the soldering of N900 and N901.

If the soldering is ok: Give the board power and start it up.

- Measure the DC voltage 3,2V (VANA) at N901 pin1,18,3,2.

  If VANA is missing at pin1,18,3,2, send the unit on according to the local company directives.

  If VANA is correct at N901 pin1,18,3,2: Measure the DC voltage 4,6V at N900 pin1.

  If the level at N900 pin1 is too low or missing:
  Check the soldering and the resistance of R916~33 kohms and R918~33 kohms.

  Replace the faulty component.

If R916 and R918 are ok:
Replace the components C919, V901, N900 one by one. After each replacement, give the phone power and start it up and check the DC voltage 4,6V at N900 pin1

If the DC voltage 4,6V at N900 pin1 is correct:

Replace N900 and N901.

If the fault still remains send the unit on according to the local company directives.

4.1.3 Hands free problems (microphone)

Check visually the system connector of the phone (if its damaged, dust...).

Disassemble the phone and check for liquid damage, especially at the system connector-pads.

No further action should be taken for a liquid damaged telephone.

Check the soldering of N800, pin19.

- Measure the resistance of R825~3,3 kohms, R830~470 ohms, R802~3,9 kohms, and R805~15 kohms.

  Replace the faulty component.

  If all the resistances are ok:
  Measure the resistance of C835 >1kohm,C817 >100 kohms, C810 >10 kohms and C812 >100 kohms.

  Replace the faulty component.

If the fault remains send the unit on according to the local company directives.

4.1.4 Hands free problems (earphone)

Check the system connector of the phone visually (if its damaged, dust...).

Disassemble the phone and check for liquid damage, especially at the system connector-pads.

No further action should be taken for a liquid damaged telephone.

Check the soldering of N800, pin22.

- Measure the resistance of R804.

  If it is lower than 50 kohms, replace F601 and R804.

  If the fault remains, measure the resistance of R806~100 ohms.

  If R806 is ok, measure the resistance of C813 >100 kohms.

If the fault remains send the unit on according to the local company directives.

4.1.5 The hands free can not be detected

Check visually the system connector of the phone (if its damaged, dust...).

Disassemble the phone and check for liquid damage, especially at the system connector-pads.

No further action should be taken for a liquid damaged telephone.

Check the soldering of D600, pin67 and pin70.

- Measure the resistance of R636 ~22 kohms, R635~22 kohm, R601~1 kohm and R605~1kohm.

  Replace the faulty component.

  If the fault remains, replace D600.

If it does not help, send the unit on according to the local company directives.

4.1.6 Microphone and earphone problems

Check visually the system connector of the phone (if its damaged, dust...).

Disassemble the phone and check for liquid damage, especially at the system connector-pads.

No further action should be taken for a liquid damaged telephone.

Check the soldering of D600, pin67and pin70.

- Measure the resistance of EXTAUD to ground. It should be >10 kohms.

  If the resistance is lower than 10 kohms, replace F600.

- Measure the resistance of PORTHF to ground. It should be >10 kohms.

  If the resistance is lower than 10 kohms, replace F602.

- Measure the resistance of R636~22 kohms, R635~22 kohmsR601~1 kohm and R605~1 kohm.

  Replace the faulty component.

  If the fault remains:
  Replace D600.

  If it does not help, send the unit on according to the local company directives.

Noisy sound

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Give the board power and start it up.

- Measure VDIG at C600 and VDSP at C900, both should be 3,2V.

  If one of the values is incorrect, go to section On/ Off problems.

- Measure VDSPC =2,5V, at R727.

  If the VDSPC is low, switch off the board, measure the resistance between VDSPC and ground.

If the VDSPC is low and the resistance between VDSPC and ground is <10kohms, replace the components one by one and check the resistance after each replacement: C903, C904, C905, R727, N701 and D900.

If the VDSPC is low and the resistance between VDSPC and ground is >10kohms, replace the components one by one and check the 10 kohms after each replacement of V703, R727 and N701.

If the VDSPC is correct
Switch off the board, check the soldering of D600 and D900,
if they are ok, replace D600 and D900.

If the fault still remains send the unit on according to the local company directives.

4.1.7 Music mute problems

Check the system connector of the phone visually (if its damaged, dust...).

Disassemble the phone and check for liquid damage, especially at the system connector-pads.

No further action should be taken for a liquid damaged telephone.

Check the soldering of D600 pin69.

- If the soldering is ok, measure the resistance of R602~470 ohms.

  If R602 is ok, measure the resistance between J602 pin6 (MUTE) and ground.

  If the resistance is <100 kohms, replace F605.

  If the resistance is nearly 100 kohms, replace D600.

If the fault remains, send the unit on according to the local company directives.

5 Display/ Illumination problems

5.1 Display problems

5.2 Type of fault

Insert a fully charged battery into the phone and start it up.

If the display is missing some of the segments, go to 5.1.1

If the display is empty, go to 5.1.2.

5.2.1 Segments are missing

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Replace the display according to mechanical repair guide.

5.2.2 The display is empty

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Replace the display according to mechanical repair instructions.

Give the board power and start it up with a display mounted. If the fault still remain, check if the current consumption is less than 200 mA.

Remove the display from the holder.

Give the board power and start it up without the display mounted.

- Measure the voltage at the display pads at H623.

1. RESETO (3.2V) is incorrect, measure the resistance from the pad to pin 77 of D600 ~0 ohm. Also check the soldering at that pin. If the resistance is substantially higher there is a foil damage, send the unit on according to the local company directives. If the resistance is correct, replace D600.
2. I2CCLK (3.2V) is incorrect, measure the resistance from the pad to pin 4 of D600 ~10 kohms. If it is higher, measure the resistance of R615 ~10 kohms.

   If the resistance of R615 is correct there is a foil damage, send the unit on according to the local company directives. Check VDIG (3.2V) at R620~2.2 kohms.
   If all of the above is correct, replace D600.
3. GND is incorrect, i.e. there is too high resistance from the pad to ground, there is a foil damage, send the unit on according to the local company directives.

4. VDLCD (3.2V) is incorrect, measure the resistance from the pad to pin 45 of D600 ~0 ohm. If it is higher there is a foil damage, send the unit on according to the local company directives. If it is correct, measure the resistance from the pad to ground (>2.5 Mohms). If it is incorrect, replace C615 and C674.If that does not help, replace D600.
5. VLCD (-2.7V) is incorrect, make sure that VDIG at N702 pin 5 is 3.2V.
   Measure the resistance from the pad to pin 1 of V611 ~0 ohm. If it is too high there is a foil damage, send the unit on according to the local company directives.
   Check the soldering at D600 pins 95 and 96.
   Measure the voltage at V611 (pin 1: -2.7V, pin 2: -1.6V, pin 3: -2.5V) and V608 (pin 1: -1.6V, pin 2: 0V, pin 3: -1.0V).
   If any of the voltages are incorrect, replace the corresponding diode and try again. If the problem still remains, measure the resistance of C632, C634, C636 >2.5 Mohms, C631, C633 >100 kohms and C824 >25 kohms.
   If any of the resistances are incorrect, replace the corresponding capacitor.
   Also measure the resistance of R616, R639 ~100 kohms, R807 ~82 kohms and R808 ~33 kohms.
   If any of the resistances are incorrect, replace the corresponding resistor. If the fault remains, replace D600.
6. I2CDAT (3.2V) is incorrect, measure the resistance from the pad to pin 3 of D600 ~10 kohms. If it is higher, measure the resistance of R614 ~10 kohms.
   If it is correct there is a foil damage, send the unit on according to the local company directives. Check if there is VDIG voltage (3.2V) at R619 ~2.2 kohms.
   If the voltage is lower, go to chapter On/ Off problems.
   If all of the above is correct, replace D600.
7. If the fault is not fixed, send the unit on according to the local company directives.

5.3 Illumination problems

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure that all 15 LED’s are correct mounted and soldered.

Replace the faulty component.

Give the board power and start it up.

The LED’s H651-H654 and H662 are for the display light (group D LED’s).

The LED’s H655-H660 and H663-H666 are for the keyboard illumination (group K LED’s).

At the start all the LED’s should LIT for 10 sec.

Replace the faulty LED.

5.3.1 If all the LED's in group D are not lit

- Check the soldering and measure the resistance of R609, R660, R607 and R608.

  Replace the faulty component.

If the fault remains, give the board power only, do not switch it on.

- Measure 3,4VDC at V613 pin3.

  If it is above 3,4VDC,replace the LED's in group D one by one until the fault is gone.

  If the 3,4V is ok, start up the board.
  Measure1,7V DC at V613 pin1.

  If yes 1,7VDC,replace V613.

  If no 1,7VDC,replace C656.

- If the fault remains, measure the resistance between V613 pin1 and D600 pin92. It should be 1 kohm.

  If it is ok (1 kohm) replace D600.

  If the resistance is high, send the unit on according to the local company directives.

5.3.2 If all the LED's in group K are not lit

- Check the soldering and measure the resistance of R610, R607 and R608.

  Replace the faulty component.

If the fault remains, give the board power only, do not switch it on.

- Measure 3,4VDC at V614 pin3.

  If it is above 3,4VDC,replace the LED's in group K one by one until the fault is gone.

  If the 3,4V is ok, start up the board.

- Measure1,7V DC at V613 pin1.

  If it is correct, replace V614.

  If it is incorrect, replace C656.

- If the fault remains, measure the resistance between V614 pin1 and D600 pin92. It should be 1 kohm.

  If it is ok, 1 kohm replace D600

  If the resistance is higher, send the unit on according to the local company directives.

5.4 Top indicator problems

5.4.1 Green top indicator

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure that the double LED H650 is correctly soldered.

- Measure the resistance of R646 ~470 ohms.

  If the resistance is ok: Give the board power and start it up.

  Measure 3,8V DC pin4 and 3,2VDC pin3 at H650.

  If it is correct, replace H650.

  If the level at H650 pin4 is low, replace C621.

  If the level at H650 pin3 is low, replace C654.

5.4.2 If the 3,8 VDC at H650 pin4 is missing

- Measure at N411 pin5 the 3,8VDC.

  If it still is missing, replace N411.

  If there is 3,8VDC at N411 pin5, send the unit on according to the local company directives.

5.4.3 If the 3,2VDC at H650 pin3 is missing

- Measure 3,2 VDC at D600 pin94.

  If yes (3,2VDC), send the unit on according to the local company directives.

  If the 3,2VDC is missing, check the soldering at that pin.

  If the soldering is ok, replace D600.

5.4.4 Red top indicator

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Make sure that the double LED H650 is correctly soldered.

- Measure the resistance of R646 ~470 ohms.

  If the Resistance is ok: Give the board power and start it up.

  Measure 3,8V DC pin2 and 3,2VDC pin1 at H650.

If it is correct, replaceH650.

If the level at H650 pin2 is low, replace C621.

If the level at H650 pin1 is low, replace C655.

5.4.5 If the 3,8 VDC at H650 pin2 is missing

- Measure at N411 pin5 the 3,8VDC.

  If it still is missing, replace N411.

  If there is 3,8VDC at N411 pin5, send the unit on according to the local company directives.

6 Capacity/ Charging problems

6.1 Type of fault

Do a visual check of the battery screws and the system connector of the phone.

Replace the faulty part if its necessary (use Mechanical Repair Instructions).

6.1.1 Charging indicator in the display all the time

Switch ON the phone.

If the charging indicator appear in the display, go to 6.1.4.

6.1.2 No charging indicator in the display

Connect a charger to the system connector of the phone.

Switch ON the phone.

If the charging indicator does not appear in the display and the red top indicator does not light up, go to 6.1.5.

6.1.3 Charging indicator in the display, but the phone does not charge

Connect a charger to the system connector of the phone.

Switch ON the phone

If the charging indicator appear in the display and the red top indicator light up, but the customer complain of charging his battery, go to 6.1.5.

6.1.4 Charging all the time

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Check the soldering and measure the resistance of R430 ~33 kohms and

R403 ~100 kohms.

Replace the faulty component.

If the fault still remains, send the unit on according to the local company directives.

6.1.5 No charging

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Visually check the system connector from burn and oxidation.

Visually check the pads of J602 of the board from burn and oxidation.

- Measure the resistance of R421 ~0,1 ohm and R411~390 ohms.

  Replace the faulty component.

- If the fault remains:
  Measure the resistance between DCIO and VBAT ~390 ohms.

  If the resistance is too low, Replace V401.

  If R421 and R411 are ok or replaced and the resistance between DCIO and VBAT still is too high, send the unit on according to the local company directives

- If all the resistance are ok and the fault still remains: Give the board power and start it up by grounding N450 pin 6.

  If it does not start, replace V401.

  If it still does not start, replace V704.

If the fault still remains, send the unit on according to the local company directives.

6.2 Verification of charging function

Attach a battery to the phone. The battery voltage must be high enough to get the phone started, if it is too low the charging will not begin.

Cut a piece of cable from a charger and make a charging test cable. Connect the cable to a power supply and an Ampere-meter.

Make sure the positive cable gets connected to the DCIO at the system connector.

Set the power supply to 7.6 Vdc and current limit at ~700 mA.

Connect the contact to the system connector at the phone and read the current consumption.

If the phone gets started and shows charging in the display and you can read a current consumption between ~700 mA and ~5 mA, at an interval of a few seconds the charging function is normal.

7 Sim Problems

7.1 What is “SIM fault”

Insert a working SIM-card and a fully charged battery into the phone and start it up.

If the display says:

- **“Wrong card”** or **“Insert correct card”** the phone is SIM-locked and cannot be repaired at this level
- **“Phone lock”** the customer has locked the phone with a personal code. The phone is unlocked in the reset program in the ordinary flow.
- **“Pin?”** or **“Enter pin”** the SIM is locked with a personal code.
- **”Tampered”** the customer has been trying to replace the software data into the phone. The phone cannot be repaired at this level.
- **“Insert card”** then, and only then, there is a SIM fault

7.2 “Insert card” fault

Replace the Sim-card holder without disassemble the phone, according to mechanical repair guide. If the fault still remain disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

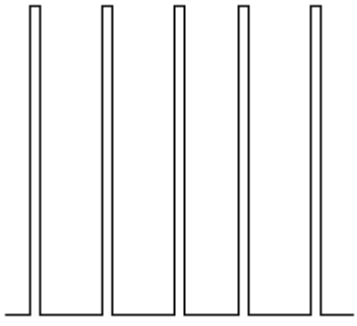
Check the soldering at D600 pads 72 to 75. If the soldering are correct, place the board in the fixture, measure the signals to the SIM-card using an oscilloscope.

Set the oscilloscope at DC-measurement. 1V/frame and time measurement: roll.

Measure at the SIMVCC-pad. Give the board power and start it up. Directly at start the phone sends 5 pulses to the SIM, with an amplitude of 5V as in the figure below.

Do the same procedure at the SIMCONCLK-, SIMCONDAT- and SIMCONRST-pads.

OBS! The phone has to be restarted between each measurement.



7.2.1 If the signal of the SIMVCC is low or missing

- Measure at D601 pin 1~3,2 VDC

  If the level is missing or low replace C626, R682, D601.

  If the level is ok measure the resistance from the SIMVCC-pad to ground. It should be >2 Mohms.

  If it is lower, replace C625, C635, C627 and R683.

  If the resistance is ok: Measure with the oscilloscope at D601 pin 4,give the board power and start it up. Five pulses with an amplitude of 3,4 V will appear in the oscilloscope.

  If yes (pulses) Replace D601and C693

  If no (pulses) measure the resistance between D601 pin 4 and D600 pin 72,it should be ~0 ohm.

  If the resistance is substantially high, send the unit on according to the local company directives.

  If it is ~0 ohm replace D600.

7.2.2 If the signal of the SIMCONCLK is low or missing

- Measure at D601 pin 1~3,2 VDC, if the level is missing or low replace C626, R682, D601.

  If the level is ok measure the resistance from the SIMCONCLK-pad to ground. It should be >2 Mohms.

  If it is lower, replace C629 and R627.

  If the resistance is ok: Measure with the oscilloscope at D601 pin6, give the board power and start it up. Five pulses with an amplitude of 3,4 V will appear in the oscilloscope.

  If the pulses are correct, replace D601and C693.

  If they are incorrect, measure the resistance between D601 pin6 and D600 pin 75,it should be ~0 ohm.

  If the resistance is substantially high, send the unit on according to the local company directives

  If it is ~0 ohm, replace D600.

7.2.3 If the signal of the SIMCONDAT is low or missing

- Measure at D601 pin 1~3,2 VDC, if the level is missing or low replace C626, R682, D601.

  If the level is ok measure the resistance from the SIMCONDAT-pad to ground. It should be >2 Mohms.

  If it is lower, replace C630, R628, and R683.

  If the resistance is ok: Measure with the oscilloscope at D601 pin5, give the board power and start it up. Five pulses with an amplitude of 3,4 V will appear in the oscilloscope.

If the pulses are correct, replace D601and C693.

If they are incorrect, measure the resistance between D601 pin5 and D600 pin 74,it should be ~0 ohm.

If the resistance is substantially high, send the unit on according to the local company directives.

If it is ~0 ohm, replace D600.

7.2.4 If the signal of the SIMCONRST is low or missing

- Measure at D601 pin 1~3,2 VDC, if the level is missing or low replace C626, R682, D601.

If the level is ok measure the resistance from the SIMCONRST-pad to ground. It should be >2 Mohms.

If it is lower, replace C628 and R600.

If the resistance is ok: Measure with the oscilloscope at D601 pin7, give the board power and start it up. Five pulses with an amplitude of 3,4 V will appear in the oscilloscope.

If the pulses are correct, replace D601and C693.

If they are incorrect, measure the resistance between D601 pin7 and D600 pin 73,it should be ~0 ohm.

If the resistance is substantially high, send the unit on according to the local company directives.

If it is ~0 ohm, replace D600.

8 Key problems

8.1 Verify the fault

Insert a SIM card and a fully charged battery into the phone. Start it up by pressing the On/Off key.

- If it does not start at all, go to chapter On/0ff problems.

Press all the keys to verify which ones are faulty. Verification is most easily done like this:

1. Go to “menu/settings/key sound” and choose “click”.
2. Press the keys 1-9, *, 0, #. You should hear a clicking sound at every key pressed and the corresponding symbol should appear in the display.
3. Press “Yes”, “No”, “clr”, “<“ and “>”. When pressing “Yes” the phone should attempt to connect a call and pressing “No” should make it disconnect it. Pressing the “clr” key should erase symbols in the display and by pressing “<“ and “>” you should skim through the menu.
4. Press the volume buttons, a clicking sound should be heard at every press.
5. Press the PTT button, a clicking sound should be heard.
6. Press the ALERT button, a clicking sound should be heard.
7. Activating the SPEAKERPHONE switch, a warning signal should be heard.
8. If one or both of the volume keys are non functional, go to 8.2
9. If the PTT button is non functional, go to 8.3
10. If the Alert button is non functional, go to 8.4
11. If the SPEAKERPHONE switch is non functional go to 8.5
12. If one or more of the keyboard keys are non functional go to 8.6

8.2 Volume button malfunction

Disassemble the phone and check for liquid damage, especially around X824, X825, X826 and X827.

No further action should be taken for a liquid damaged telephone.

Make sure that the function of the micro switches in the front cover is ok, if not replace the faulty switch according to mechanical repair instructions.

- Measure the resistance from the pad X824-X827 to ground >1 Mohm.

  If it is less, go to.8.2.1

  If the resistance is correct, go to 8.2.2

8.3

- If the resistance to ground is to low from the pad:

  X824: replace C657 and C687.

  X825: replace C658 and C688.

  X826: replace C658 and C688.

If the fault still remains, replace D600.

Check the soldering at D600 pins 122, 123 and 128.

- Measure the resistance from X824 to D600 pin 123, from X827 to D600 pin 122 and from X825/X826 to D600 pin 128, (all of them ~0 ohm).

  If any of the resistances are incorrect there is a foil damage, send the unit on according to the local company directives. If they are all correct, replace D600.

8.4 PTT button malfunction

Disassemble the phone and check for liquid damage, especially around X820 andX823.

No further action should be taken for a liquid damaged telephone.

Make sure that the function of the micro switches in the front cover is ok, if not replace the faulty switch according to mechanical repair guide.

- Measure the resistance from the pad X820 and X823 to ground >1 Mohm,
  if it is less, go to.8.3.1

  If the resistance is correct, go to 8.3.2

8.4.1

- If the resistance to ground is to low from pad:

  X820: replace C601 and C689.

  X823: replace C658 and C688.

If the fault still remains, replace D600.

8.4.2

- Check the soldering at D600 pins 125 and 128.
  Measure the resistance from X820 to D600 pin 125, from X823to D600 pin 128
  (all of them ~0 ohm).

  If any of the resistances are incorrect there is a foil damage, send the unit on according to the local company directives.

  If they are all correct, replace D600.

8.5 Alert button malfunction

Disassemble the phone and check for liquid damage, especially around X828 andX829.

No further action should be taken for a liquid damaged telephone.

Make sure that the function of the micro switches in the front cover is ok, if not replace the faulty switch according to mechanical repair guide.

- Measure the resistance from the pad X828 to ground >1 Mohm,

  If it is less, go to.8.4.1

  If the resistance is correct, go to 8.4.2

8.5.1

- If the resistance to ground is to low from pad:

  X828: replace C624.

If the fault still remains, replace D600.

8.5.2

Check the soldering at D600 pin 120.

- Measure the resistance from X828 to D600 pin 120 ~0 ohm.

  If the resistance is incorrect there is a foil damage, send the unit on according to the local company directives.

  If they are all correct, replace D600.

8.6 Speaker phone switch malfunction

Make sure there is no mechanical damage at the switch on the front cover

If there is, the front cover has to be replaced according to mechanical repair guide.

The connection between the switch, mounted on the front cover, and the logic is non-mechanic based on hall effect.

- Measure the resistance from the pad X825 to ground >1 Mohm,

  If it is less, go to 8.5.1

  If the resistance is correct, go to 8.5.2

8.6.1

- If the resistance to ground is to low from pad X825 replace C658 and C688.

If the fault still remains, replace D600.

Check the soldering at D600 pin 124 and 128.

- Measure the resistance from X825 to D600 pin 128, and from P611 to D600 pin 124 ~0 ohm.

  If the resistance is incorrect there is a foil damage, send the unit on according to the local company directives.

  If they are all correct, replace D600.

8.7 Keyboard key malfunction

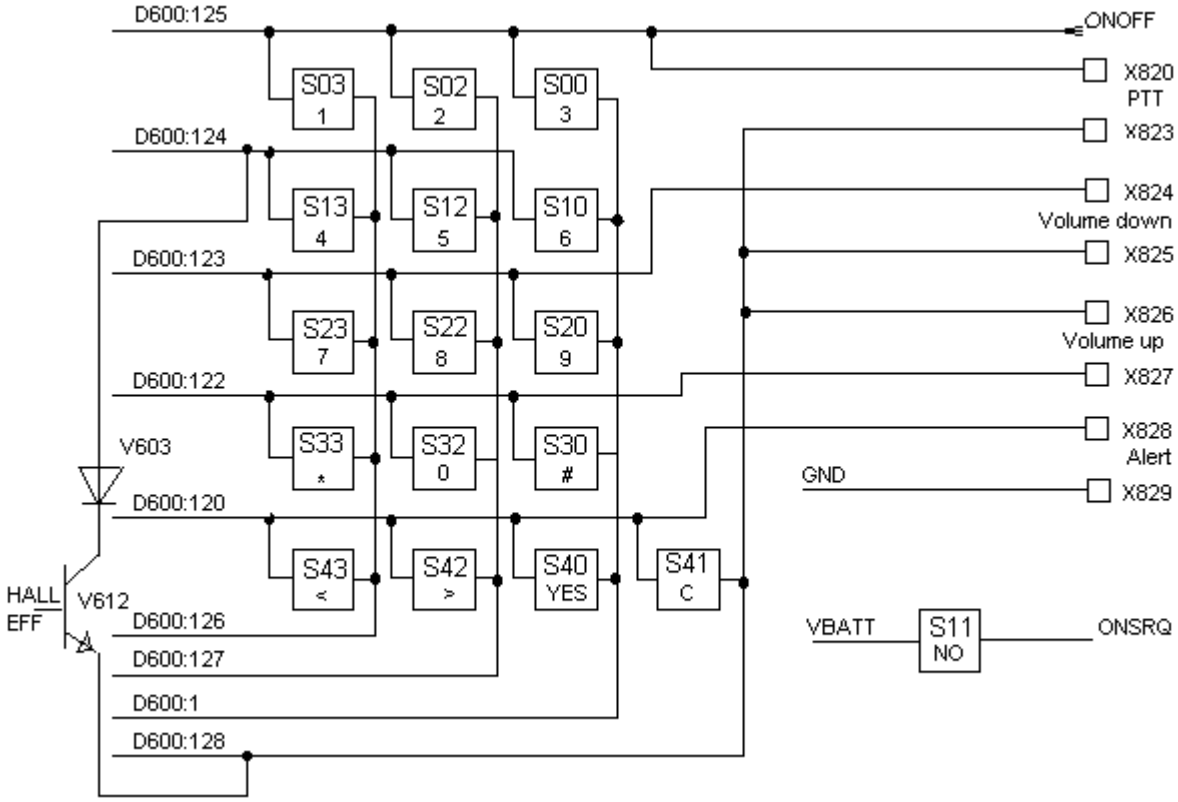
Disassemble the phone and check for liquid damage, especially around the keys that are non-functional.

No further action should be taken for a liquid damaged telephone.

Remove the domefoil and clean the keypads thoroughly and mount the phone with a new domefoil, according to mechanical repair guide. If that did not help, disassemble the phone and check the soldering at D600 pins 120-128 and 1 If they are correct, give the board power and start it up.

Measure VDIG (3.2V) at C600.

The functional schema is shown in the figure below.



Make sure there is voltage (3.2V) at the pads of the keys.
Note that the “No” key has 4.8V.

If the voltage is missing at an entire row of keys, measure the voltage at the corresponding pin of D600

- If the voltage is correct at D600 there is a foil damage, send the unit on according to the local company directives.
- If the voltage is missing there too, replace D600.

If VDIG is missing at any row of keys, for instance key 2 and 3, but at key 1 there is voltage, there is a foil damage, send the unit on according to the local company directives. This can be verified by measuring the resistance from a functional key to one that is not functional (~0 ohms). If the resistance is incorrect there is a foil damage.

If an entire column is non-functional, measure the resistance from the pad to the corresponding pin of D600.
If there is a foil damage, send the unit on according to the local company directives.

If only part of a column is non-functional, measure the resistance from a functional keypad in that column to a non-functional to verify a foil damage.

9 Alert problems

9.1 Type of fault

Insert a dummy battery and a SIM card into the phone, start it up.

Go to the “menu /Ring Vol.” and activate the vibrator and rise the volume to max. Switch off the phone and restart it. At the start, the phone will activate the buzzer, vibrator and the illumination.

1. Wait for the phone to get serv (with the GSM test instrument or the public net).
2. If it does not make a beep or it makes a low beep go to 9.2
3. If the vibrator does not activates go to 9.3.

9.2 Buzzer problems

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Place the board in the fixture, mount a new buzzer to the board give power and start it up.

- If the buzzer does not gives a beep measure 4,8 V at C619.

  If the DC level is low replace C619 and V606.

Restart it and check if the buzzer gives a beep.

- If it does not make a beep measure the resistance and check the soldering of J600, R661, R606 and R651.

  Replace the faulty component, and start it up again.

- If the fault remains measure with the oscilloscope at V606 pin 1, give the board power and start it up.
  At the start (10 pulses) with an amplitude of 3.2 V will appear in the oscilloscope.

  If no pulses appear, measure the resistance between D600 pin91 and V606 pin 1.

  If it is correct (470 ohms) replace C653 and D600.

  If the resistance is extremely high between D600 pin91and V606 pin1, send the unit on according to the local company directives.

9.3 Vibrator problems

Disassemble the phone and check for liquid damage.

No further action should be taken for a liquid damaged telephone.

Place the board in the fixture. Mount a new vibrator to the board give power and start it up.

- If the vibrator does not operate, measure the resistance and check the soldering of J601, F603, R624, R621, R618, R613, R611 and R617.

  Replace the faulty component.

Replace C612, C613 and C622.

Restart the board and check if the vibrator is operating.

- If the fault remains, measure with the oscilloscope at N601 pin1, give the board power and start it up.
  At the start 3 pulses with an amplitude of 3.2V will appear in the oscilloscope.

  If the pulses are correct at N601 pin1, restart the board and check the pulses at pin4.

  If the pulses are incorrect at pin4, check 4,8V DC at pin5. If it is ok, replace N601.

  If the pulses are correct at N601 pin 4, replace V615.

  If the pulses are incorrect at N601pin1, measure the resistance between N901 pin4 and N601 pin1. It should be ~4,7 kohms.

  If the resistance is ok, check the 3,2V DC supply to N 901 pin1 and pin3.

  If the 3,2V is ok, replace N901.

If the fault remains send the unit on according to the local company directives.

10 Data communication problems

Make a general visual inspection for corrosion or oxidation from liquid damage.

No action should be taken for liquid damaged phones, send the unit on according to the local company directivess.

NOTE! All Fax and Data calls are initiated from the appropriate computer software.

If the SIM-card does not support separate fax and data numbers, you need to turn on the data menus. In menu settings Data menus select YES.

Make sure there is no damage at the system connector J602.

- Check the soldering and measure the resistance of R625~470 ohms, R622~1 kohm and R650~100 kohms, also make sure the varistor F604 is ok >2 Mohms.

  If they are correct, replace D600.

If the fault still remains, send the unit on according to the local company directivess.

11 Other problems

11.1 Real Time Clock problems

11.2 Finding the fault

Start the phone with a SIM-card. Set the correct time. Remove the battery and re-insert it after a minute. If the time says 00:00, go to 11.3. Compare to the correct time. If the clock is speeding or is halted, go to 11.4.

11.3 The time says 00:00 after removing and reattaching the battery

Disassemble the phone and make sure the backup capacitor (C720), is correctly soldered.

If it is, replace it.
Place the board in the fixture, start it up and set the correct time.
Wait a few minutes for the backup capacitor to charge.
Restart the phone after a minute, check if the problem is fixed (the backup capacitor needs a few hours of charging to reach full capacity).
Compare to the correct time. If the clock is speeding or is halted, go to 11.3.

11.4 The clock is speeding or is halted

Make sure that pins 117 and 118 of D600 are correctly soldered.
Also make sure the RTC crystal (B600), is correctly soldered.
If it is, replace B600, C690 and C691.

If the fault still remains, send the unit on according to the local company directivess.

12 Revision History

Rev.	Date	Replaces / Comments
B	99-09-27	Pin placement added Go/No Go elucidation added Component classification in text removed Figures replaced due to new circuit board layout
C	99-11-16	Division into chapters / chapters headings replaced. Figures in document removed. Component placement reference added. Go/ No GO elucidation removed.
D	1999-12-15	Convert from Framemaker to Word Linguistic errors corrected